AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN CHRONIC RENAL DISEASE AND THE CONDITION OF EXCITEMENT AND DEPRESSION IN THE INSANE.

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It is an old observation that Granular kidneys are discovered in the post mortem room of a Lunatic Asylum with a frequency much greater than what is found outside of such institutions. In the lectures on Insanity to the students at University College, London in the year 1865, Dr. W. H. O. Sankey said, "Adhesions of the Capsule occurred in nearly one half of the cases of which I have retained notes," and he referred to confirmatory observations (by Sutherland and others) which had been made earlier than that year. From that time references have been frequently made to the subject in the literature of Insanity, and in recent years more attention has been paid to it. Amongst others who have contributed to the literature of the subject, are Dr. Hubert Bristowe, Dr. Beadles and Dr. Bond, and I have made use of their papers in my investigations.

The object of the present investigation has been to ascertain whether this frequency is alleged or real, and, if found to be real, then as far as possible to discover the cause or causes of this frequency of granular kidney in the insane. In attempting to arrive at some conclusions I have taken into consideration the following data, viz:- age, occup-

ation, duration of residence in the asylum, nature of the mental disorder, and the cause of the insanity as far as that could be discovered. The statistics which I have collected and am about to discuss have been taken from the notes on patients who have died in the Lancashire County Asylum, Prestwich, between the dates, Sept. 25th 1897 and July 3rd 1898, being 110 consecutive cases. Out of this number I have excluded 10 as not being adapted to my purpose, seeing that they were cases of malformation of the kidney, suppurative nephritis, calculus, pyelo-nephritis, renal infarctions, &c.,

The standard I have set myself, for determining whether a given kidney should be placed in the category of granular or non-granular, has been:- adhesion of capsule to cortex, granular surface of the stripped kidney, wasting of the cortex, increased consistence, occurrence of cysts and diminution of weight. It is true that in very few of the kidneys which I have examined was every one of these stigmata present but as in all diagnosis, the opinion is based on the balance of probabilities, so here, it has been based upon the balance of evidence. It is important to notice and I wish to lay stress upon the point, that

I have grouped the kidneys into granular and non-granular, not into granular and normal, and in my non-granular class there are placed normal, congested and large white kidneys. In fact, all the kidneys which have no granular change, are classed together irrespective of any other lesion.

Having made these necessary explanations, I shall now take up the first point which I have set myself to investigate, viz:- is this frequency real, and not merely apparent?

From the statistics given in various papers in recent years there can be no doubt that there is most marked frequency of granular kidney disease, and that in cases where there were no clinical symptoms to lead one to suspect any kidney lesion. From statistics supplied to Dr. Bond I find that out of 422 cases dying in St. Bartholomews Hospital, 26% had granular kidneys and in Dr. Dickinson's article on Disease of the Kidney in Dr. Clifford Albutt's System of Medicine, I find that out of 58 cases dying in St. George's Hospital, as the result of accident, 15 or 25.8% had affected kidneys. These numbers 26% and 25% coincide in a remarkable manner and may be taken as the normal number of granular

kidneys one may expect to find in ordinary necropsies. Now, let us compare these percentages with those in asylums. Dr. Bond (1) finds that out of a series of 154 cases, 48% had certain signs of interstitial nephritis. Further statistics are given by Mr. C. Beadles in an article in the Journal of Mental Science and by Dr. H. C. Bristowe in the same periodical. Dr. Beadle's (2) gives 70.6% as having chronic renal disease out of 150 cases but later out of a series of 2619 cases he found that only 1128 or 43.21% presented signs of kidney trouble. Dr. Bristowe (3) gives a pereentage of 61.46 having kidney disease in the cases investigated by him. These percentages do not agree, but the discrepancy is most probably due to the fact of different standards having been adopted by the different observers. Dr. Bond has excluded kidneys having solely "A fatty, tuberculous or waxy change" and has limited himself to the "morbid conditions which might have been brought about by over indulgence in alcohol." This exclusion must necessarily increase greatly the percentage of cases returned as being free from chronic interstitial nephritis and approaches nearly to the standard I set myself in examining the kidneys coming

(1) Brit. Medical Journal, March 2nd 1895.
(2) Journal of Mental Science January 1895.
(3) Journal of Mental Science, July 1895.

under my notice, a standard fixed before reading Dr. Bond's paper and mentioned earlier in my paper.

I find that out of 100 cases examined by me 44% are grouped as having granular kidneys while the remaining 56 include, normal, large white kidneys, malformations, &c. If we consider that Dr. Bristowe has included these conditions among his cases and that there is only a difference of 3% on either side of 45% in the results arrived at by Beadles, Bond and myself I feel that it is not far from the truth to take 45% as the normal number of granular kidneys in the insane. There is thus an undoubted increase of 20% in the frequency of the condition as compared with the figures of a general hospital.

This well marked frequency of chronic interstitial nephritis in the insane being established, it is now necessary to look at the different factors ordinarily described as the cause of this disease and ascertain which, if any, of these is the factor in producing the condition in the insane. Climate, Antecedent Acute Nephritis, Gout, Lead, Alcohol, Cardiac Disease, Pregnancy, Malaria, Obstruction to the Exit of Urine, Heredity and Mental Depression, are the chief

causes enumerated

causes enumerated by Dickinson in Dr. Clifford Allbutt's System of Medicine, and I intend now to examine each of these in turn.

Climate.

Climate, in this connection, may be discarded in a word, as though the insane are removed from their homes, yet they are still subject to the same vicissitudes of climate as the sane. And with climate we may dismiss Antecedent Acute Nephritis, as this is usually associated with Scarlet Fever and other diseases of childhood and as liable to have occurred in the childhood of the sane as the insane.

Gout.

As my cases are collected from a pauper Asylum, gout, as a cause need hardly detain us, as I have not met with one case showing any of the usual symptoms of gout among the large number of patients which have passed under my observation in an asylum having over 2500 patients resident within its walls.

Lead.

Along with lead as a cause , I shall group occupations in general, as the most frequent cases of kidney disease from lead poisoning occur in those whose occupation brings them into contact with the

metal or its salts, such as painters, plumbers, workers in potteries, &c. After a careful examination of the different trades in which the hundred cases which I have collected were engaged before admission into the asylum, I find that of two patients who were painters one had granular kidney and the other a normal, and the following is a table showing the frequency of the disease in other trades.

Table I. Showing the occupation of 33 patients with the condition of their kidney at death.

Occupation.	Granular.	Non-Granular.
Labourer	6	9
Cotton Operative.	1	7
Iron Worker.	3	3
Compositor.	1	1
Painter.	1	1

I have not classified the others as the trades and occupations are so multifarious and the numbers are so small that no comparison could be made.

The precentage of labourers and iron-workers having affected kidneys is high whereas that of the cotton operatives is low and as these two former trades have never been looked upon as being specially dangerous to the kidneys, and the latter by some authorities as being so, we must look upon this unusual

percentage as being in this connection capricious and in no way connected with the occupation of the patients.

The occupation of the females I have not turned my attention to, because, although most of the women of the working classes in Lancashire at one time or another have a trade, so many of my cases are married and are entered in the books with "Occupation - Housewife" that all previous history of their occupation is lost.

Alcohol.

I now come to a cause at which it is more difficult to arrive at a conclusion, namely, alcohol. It is so mixed up with other causes, associated with certain occupations and at the same time bears with it a certain amount of shame, that it is almost impossible to get the friends of patients to estimate it at its true value. Then there are so many different degrees and ways of being addicted to drink. One man may be a "soaker" for years and show little or no signs of mental deterioration, while another who indulges in the same way may become at last an inmate of an asylum and yet another, a moderate drinker, may be, takes to a bout of drinking and soon finds himself a certified

lunatic. Probably of the latter two men the only one entered in the Asylum books as having his insanity caused by drink is the one who broke down after the violent outburst of drinking and yet the other very possibly has done more harm to his kidneys by his constant soaking.

Besides this difficulty of eliciting a true history, there is also the further one, namely, the difference in opinion of experts on kidney disease as to the true value of alcohol as a cause of chronic interstitial nephritis. Professor Sir T. Grainger Stewart[1] in his article on Chronic Brights' Disease in Quain's Dictionary of Medicine, states that excessive use of Alcohol is one of the most common causes of chronic interstitial nephritis, but Dickinson, in an article already cited, says, [2] "Alcoholic drinks have a less influence in causing renal disease than has often been supposed," and he gives some valuable statistics. Out of 149 persons to whom drink was presented in the way of duty, such as brewers' draymen, &c., 31 were found after death to have granular kidneys, while out of the same number to whose

(1) Quain's Dictionary of Medicine.
(2) Dickinson, Op. Cit.

occupation drink bore no relation, 27 displayed granular kidney. These draymen, &c., represent the class of which I have spoken, the constant soakers, and Dickinson also supplies us with other figures of a class of which the man who is admitted into an Asylum after a fierce outburst of drinking may be taken as a representative. In the course of 31 years at St. George's Hospital 58 post mortem examinations were made on cases dying in delirium tremens and of these 7 had granular kidneys while out of the same number dying as the result of accident, 15 were found to have granular kidneys.

In order to show Dr. Dickinson's figures more clearly I have arranged the following table of percentages.

Table II. Showing the percentage of cases having granular kidney in 4 series of cases:-

A.	Persons exposed to Drink in their occupation	20.8
B.	" not " " " "	18.7
C.	" dying from Delirium Tremens	12.0
D.	" " as result of Accident	25.8

Here at a glance we see that in this series of cases at anyrate, alcohol has not been a powerful predisposing factor in the causation of the kidney trouble under discussion.

Dr. Bond, however, is a believer in alcohol as being of paramount importance in the causation of granular kidney, and in his paper he proceeds to compare the percentages of renal cases with those of cases entered in the Asylum records as being caused by drink and he draws the conclusion that"of the patients admitted into the London Asylums, more than twice the number than is at present stated owe their entrance, partly at anyrate, to the abuse of Alcohol." He bases this conclusion on the fact that there is a difference of 18.8% of granular kidneys to be accounted for, after making deductions for the cases with an ascertained history of drink, between his cases and those of St. Bartholomew's Hospital; this difference he assumes to the cases having a drink history which has not been ascertained in the clinical examinations of the patients. This it appears to me is assuming too much. He, himself, gives the average percentage of cases ascribed to drink in the four London County Asylums as 13.4, and one would reasonably expect that, if drink were such a potent cause of renal disease, at least the percentage among his 74 cases of kidney trouble would not be less than this

But, what do we find? Only 5 of these cases, or 6.7% have a drink history. In my series of cases

the same thing obtains. During the 10 years 1878 - 1887 the percentage of cases with the cause of the insanity ascribed to Alcohol in the asylums and registered hospitals in England and Wales is 13.4 which corresponds closely to that of my hundred cases, viz:- 12%, yet when we analyse these cases, we find that out of 44 with granular kidney, only 4 or 9.1%, are given as having drink as a cause of the insanity, while of the others 17% are due to drink. Thus we see that among the very cases where we would expect to find a strong drink history, it is wanting and I feel that we are bound to come to the conclusion that in the insane at least, drink is not that all important factor in the production of granular kidney, which some writers would have us believe, and we are compelled to look in some other direction for the cause of the frequency of its occurrence in the insane.

Cohnheim says of drink "The habitual indulgence in an excess of alcoholic drinks is so widely prevalent especially amongst inhabitants of large towns that too much importance should not be attached to the frequent occurrence of chronic Bright's disease in drinkers; and at any rate it is certain that while chronic gastritis, clouding of the pia or hepatic changes are found in the great majority of inveterate drunkards, their kidneys are

mostly in an excellent condition, being large, firm and supplied with an abundance of blood." (1)

Cardiac Disease.

There is such an intimate relation between the condition of the heart and that of the kidneys that it is a difficult matter at times to say which is the primary affection. In necropsies on the insane it is found that the heart is very commonly affected to some degree, but it is usaully slight and in the cases before me I find that death was due to some cardiac lesion in 11%. Greenlees in Hack Tuke's Dictionary of Psychological Medicine says that the proportion of heart deaths varies from 6 to 13%. In his paper on Diseases of the Circulatory System in the Insane, he states that "The numerical difference between heart disease in the sane and the insane, if considered over all is not great, being 8.72% of the total deaths in the former, and 9.36% in the latter. The conclusion is thus thrust upon us, that the difference of almost 20% between the sane and the insane cannot be accounted for by this fractional increase of cardiac disease in the insane.

(1) Cohnheim's Lectures on General Pathology, Vol. III. Page 1175.

Of course this percentage of 6 - 13 does not represent all the cases in which the heart shows some lesion, on the contrary 56% of my cases had some departure from the normal such as atheroma of the valves thickening of the flaps, fatty degeneration of the muscle, &c., but nothing sufficiently serious to be in itself a cause of such a general stasis of the blood as to give rise to kidney trouble.

Pregnancy.

That pregnancy is a cause of granular kidney is well recognised, and among the insane this holds good as we see from Table III., that out of 17 women who were known to have borne children, 13 had granular kidneys.

Table III. showing the frequency of granular kidney in women who had borne children and in nulliparae, along with the percentage of women who had granular kidneys from St. Bartholomew's Hospital Reports.

		Parae.	Nulliparae.
	Granular Kidney	13 or 76.4%	6 or 40%
Non-	" "	4	9

Normal frequency in women from reports mentioned above. 30.7%

But it is necessary to point out that although pregnancy is such a potent cause yet it is not the

(1) Journal of Mental Science, October 1885.

sole factor in the case of female lunatics as is shown in the above table where 40% of single women had granular kidney as compared with 30.7% in the returns of a general hospital where married and single are grouped together. There is thus a large percentage of cases which cannot be ascribed to pregnancy.

There is no need to dwell upon Obstruction to the Exit of Urine as a cause, as in none of my cases was there any such complication, and Mental Depression I shall revert to in a later part of this paper. The subject of Heredity I cannot discuss as it is impossible to get a history of the condition of the renal apparatus in the ancestors of my cases.

I have now examined seriatim the different causes of Chronic Nephritis affecting the general community and have shown that none of them is the all important factor of the increased frequency in the insane, and my search must now be among conditions affecting the insane alone, such as average age at death of those dying insane and the term of residence in the asylum.

The following table has been compiled from statistics given in Dr. Bond's paper as well as from my own statistics. In it I have shown the percentage of cases with renal disease in different age periods from

a series of 422 necropsies from a general hospital and compared them with those occurring in the same age periods in the insane. The statistics regarding the insane I have arrived at by adding Dr. Bond's numbers to my own as it enables one to get truer results when large numbers are dealt with. But I may mention that taken singly Dr. Bond's numbers and my own bear a close resemblance and it is only for the sake of greater accuracy in calculating percentages that I have grouped them together.

Table IV.

Ages	Under 30	30-39	40-49	50-59	60 & upwards.
Percentage of Kidneys showing granular changes.	7	33.8	57.3	51	62.9 Hospital cases.
	33.3	26.2	48.4	53.7	64.8 Asylum Cases.

The numbers show a marked uniformity after the age of 40 is passed, and it is from this period onwards that granular change is expected to be found in any series of cases. But on the other hand there is a difference of almost 19% in the cases under 40 which shows that senility is not the cause we are seeking for.

That the term of residence has little to do with the frequency may be seen from Table V. where the cases are grouped into granular and non-granular with the term of residence in the Asylum.

Table V.

Term of Residence.	UNDER. 1mo.	3Mos.	6Mos.	1yr.	3yrs.	10yrs.	OVER. 10yrs.
Granular Kidneys.	3	2	2	4	12	13	8
Non-Granular Kidneys.	6	6	3	6	9	20	6

Of patients under 1 year about one third have granular kidney and from that time the percentage increases but still I hope to show that that is a sequence of another condition, and not the cause of the frequency.

I have now discussed all the various conditions which are usually described as giving rise to granular kidney, and have shown that none of these is more active in causing the disease in the insane than in the sane, so now the investigation must be carried further and we must look for some condition affecting the insane alone, which may account for the increased frequency of the morbid condition of their kidneys. Although there have been many articles of late years written on this subject of frequency of granular kidney, yet they have all dealt with the pathology of the condition, and they have not entered into the clinical history of the cases nor classified

the cases according to the different forms of insanity. Dr. Bristowe alone deals of the subject in relation to General Paralysis but he did not take into consideration the clinical history of his patients but treated the matter solely from the pathological point of view. When I first began the study of this subject I had no theory as to the cause of the condit ion and approached it with an open mind, but after collecting a number of cases, I noticed that there seemed to be a relation-ship between the mental condition of the patient and the state of the kidneys. After reading over the clinical history of certain patients merely with reference to their mental condition and without consideration of previous history of drink, occupation, &c., or even of age, I felt that I could fairly accurately prognosticate the condition of the kidneys at death, and that, although none of the usual symptoms of kidney disease had been present during the life of the patients.

Leaving General Paralysis, Epileptic Insanity, and Imbecility on one side for the present, I shall occupy my attention with Mania and Melancholia. Having regard to the fact that mental depression is an accepted cause of Brights' Disease (1) and con-

(1) Dickinson. Op. Cit.

versely that the insanity of Brights' Disease is usually characterised by (1) great mental depression, fear of impending evil and suicidal tendencies, one would be inclined to think that the greater frequency of granular kidney would be found among the patients suffering from Melancholia, but exactly the opposite is the case as may be seen from the following table.

Table VI.

	Granular.		Non-Granular.	
	Males.	Females.	Males.	Females.
Mania.	11	19	10	3
Melancholia.	0	2	11	10

Out of the 43 cases of mania, 30 were found to have granular kidney, while out of 23 cases of melancholia only 2 had kidneys so affected. The history of all these cases has been carefully examined from their admission till the time of death, a period in some extending over thirty years. The 30 cases of mania with granular kidney had well marked symptoms of acute mania at one time or another during their residence. They were noisy, excited and delusional. The motor excitement was well marked and it is this symptom which seems the prominent and constant precursor of kidney change. At present I use the word precursor in the sense that the symp-

(1) (a) Clouston "Mental Diseases." (b) Dr. Alice Bennet, "Alienist & Neurologist, Oct. 1890

tom of motor excitement was noticed during life, but do not imply that it necessarily anticipated the first onset of the disease of the kidneys. It merely denotes that a certain symptom was noticed and at the time there was no hint of any kidney trouble.

Of the 13 cases of non-granular kidney in mania, 11 showed no motor excitement but belonged to the class of delusional insanity where there is not a disturbance of the emotions but some fixed delusions or hallucinations. I, therefore, introduce another table inwhich the cases of mania are sub-divided into Acute Mania, i.e. where there is much emotional disturbance, and into Delusional Insanity, and we see that the cases of delusional insnaity fall into the non-granular group.

Table VII.

	Granular.		Non-Granular.	
	M.	F.	M.	F.
Acute Mania	10	17	1	1
Delusional Insanity.	1	2	9	2

Let us now make a different classification of the mental condition. In one class, we shall group states of motor excitement and in the other states of mental depression and also those cases of delusional

insanity. We shall name the first group A and the second B.

Table VIII.

	Granular.	Non-Granular.
A.	27	2
B.	5	32

From this table we can see more clearly the import of this peculiar classification. Where there is motor excitement an enormous percentage are found with granular kidney, and exactly the reverse in cases of melancholia and delusional insanity.

The two cases of non-granular kidney with excitement are interesting. The man was twice in another asylum before his admission here, and I have not been able to obtain a history of his previous attacks. He was noisy, restless and excited on admission, and was abusive, threatening and had delusions of exaltation. But it is further noted that he lapsed into gloom at times. He died of peritonitis 2½ months after admission. His kidneys were pale, otherwise normal. There was no albumen in the urine.

The woman was also a recurrent case. In 1895 she was admitted after making several attempts to commit suicide by hanging, cutting throat, and throwing

herself downstairs. She heard "voices" accusing her of committing various crimes. She was dull, listless and evasive, but afterwards improved and was sent to the care of friends. She was re-admitted in 1897 having been confined 14 days before admission. She was now quite changed. Instead of being dull, listless and suicidal, she was wildly excited, swore at every one and had delusions of annoyance. She remained in the wildly excited state for 4 months, then died of oedema of the lungs. Her kidneys were large, otherwise normal, and the capsules stripped readily.

These two cases are interesting because of the fact that though both were excited, yet at one time or another they showed considerable mental depression and the short period of excitement, 2½ and 4 months respectively may account for the fact of their kidneys not having undergone any degenerative change.

These numbers 27 out of 29 with motor excitement, and only 5 out of 32 cases of melancholia and delusional insanity having granular kidney, are very striking and it is here we must look for the cause of the increased frequency of granular kidney in the insane. Whereas we have seen that there is little

difference between the sane and the insane when we consider the usual causes of granular kidney, now we see that among the insane there is a marked difference in the frequency of the condition when we take note of their different mental states. The tables show that a condition of acute motor excitement is associated with the occurrence of granular kidney, and it is necessary then for us to examine what is the special factor in such cases which causes the degeneration.

But, before proceeding further in this investigation, I intend to look at the condition as it affects General Paralysis, and the other forms of insanity I left previously on one side. To begin with Dr. Bristowe states that 78% of general paralytics have kidney disease, but I find that out of 23 cases only 7 or 3% had granular disease, and this seeming discrepancy may be accounted for when I repeat what I mentioned earlier in my paper that Dr. Bristowe includes conditions which I have excluded, namely, congested, fatty and other abnormal kidneys.

Well, I have divided the general paralytics into two classes according to their mental condition, and I find that of the 7 with granular disease 5 were depressed and of the 16 non-granular, only 6 were de-

pressed. This is a complete reversal from what we found in the cases of Mania and Melancholia as here it is the depressed, who seem more liable to have granular kidneys.

As regards epileptics and idiots the numbers are too small to be of any practical value and I may dismiss them by merely stating that of 5 epileptics 3 had granular kidney and there was one in each group from cases of idiocy. The three epileptics with granular kidney were noisy and excited at times but sonwas one with a non-granular kidney, while the other in this group had a mania more of the delusional type without any excitement.

Dr. Samuel West[1] in this year's Lettsomian Lectures lays great stress on the fact that granular kidney is a very insidious disease and in the early stages it presents no symptoms at all and must be recognised alone by the physical signs. He says that the first symptom may be increased frequency of micturition and only when the disease is far advanced do we get uraemia. The physical signs to be met with are increased tension, hypertrophy of the heart and albuminuria. For 3 years I have been in charge of insane patients and notwithstanding the fact of there being increased frequency of granular kidney among them, yet I cannot find one death, during that time, from uraemia. I have collected carefully and measured the quantity of urine passed by patients and do not find that there is any increased micturition among them. As regards albuminuria, I have examined the histories of 46 of the male patients whose kidneys are in my list, and none of these had albumen in the urine on admission. All the male cases are admitted by my colleague Dr. Cowen, who carefully tests the urine and he is struck with the fact that in the course of 7 years he has found albumen in the urine in very few cases indeed, in fact in a smaller proportion

(1) British Medical Journal, Feb. 11th, 1899.

than he would have expected among the same number of sane people. There are daily resident in the asylum over 1000 male patients, yet, I can only recollect one case of renal dropsy whilst I have been in residence here. Although the urine is tested in nearly every case when patients are in failing health and are admitted into the infirmary ward, yet of the 46 cases of males of whom I am treating, only one had albuminuria before death. He suffered from subacute mania with at times lapses into gloom and fear of impending death. In this case there was marked hypertrophy of the heart (17½ oz.) and traces of old endocarditis with thickening and retraction of the mitral valves. The kidneys besides being granular were fatty and had fairly recent interstitial haemorrhages throughout, giving evidence of increased vascular tension, but this was an exceptional case.

This absence of symptoms of kidney disease in the insane has been noted by many specialists on insanity. "We have only met with three instances of decided Brights' Disease among the insane; and upon inquiry in other asylums, we have found that the experience of others has been of a similar nature," this is from Drs. Bucknill & Tuke's Manual of Psychological Medic-

ine. Thus we see that there is something of an anomaly here, as the frequency of granular disease is well established and yet the symptoms are absent. It has presented a difficulty to me, because there is no indication from the usual symptoms, which cases are likely to have granular kidneys and in a large asylum it is impossible to make lengthened observations on all the patients so that one is forced to draw conclusions from analogous mental conditions and from the study of types rather than of individuals. I cannot therefore present sphygmographic tracings of certain cases and follow it up with an account of the necropsies of the same cases as, though I have taken many tracings yet it has turned out that none of the patients I examined have yet died. Of course I might have taken hospital cases and those who evidently were appraoching death, but it seemed to me that such records would be useless as the blood tension was liable to have changed from its normal state owing to failing vitality. Hence it is that I must reason from analogies.

When I found in compiling my statistics from the post mortem reports that the cases were grouping themselves according to their mental condition, and

that acute mania was accompanied by a condition of granular kidney, I formed the idea that as in Brights' Disease there was an increase of the blood tension, so in acute mania the blood pressure would be raised. But this is not borne out by my own investigations, nor ny that of others. Dr. Greenlees (1) describes the sphygmographic tracing of acute mania thus "the line of ascent of the tracing is nearly always perpendicular, the apex sharp, and the descent line short, with a fairly prominent dicrotic wave" that is, the tracing in one of a low pressure pulse.

He also noticed that in acutely melancholic patients and in stuporous melancholia the pressure is high. Dr. Whitwell (2) records a case of stupor also showing this increased vascular tension. These tracings, as well as my own, were taken with a sphygmograph, which at the best is an imperfect instrument for registering the amount of vascular tension, although it shows the character of a pulse to perfection, but Dr. Craig has recently carried on a series of investigations on the blood pressure and he has used Barnard & Hill's sphygmometer. He has found that insane patients as to their blood pressure show

(1) "Dictionary of Pathological Medicine" Hack Tuke.
(2) Lancet, October 17th 1891.

a marked tendency to fall into two large groups, "Namely, Group I. Persons with excitement who have a low blood-pressure; and Group II. persons with depression who have a high blood-pressure." (1) Further he has noted that "in delusional insanity, when the mental disorder is ideational, in contradistinction to the affective or emotional forms of insanity, the blood pressure does not always seem to greatly differ from the normal blood pressure of a healthy individual "The tendency is for it to be raised, but this is only to a marked extent when the patient is troubled and worried." Now let us compare the conclusions with the results I have obtained as regards granular kidney. Dr. Craig divides mania into the acute form where there is much excitement and into delusional insanity, and he is forced to do so because they differ as regards the state of the blood pressure and I was forced to make the same subdivision in relation to the condition of the kidneys. In acute mania the blood pressure is low and the kidneys are found to be granular, whereas in delusional insanity and melancholia the pressure is either raised or it is normal and in these cases the kidneys are non-granular. Here then is a most interesting agreement of facts which I

(1) Lancet, June 25th 1898.

shall endeavour to show in discussing the pathology of the subject, to be not a mere coincidence.

It will be remembered that in General Paralysis I could not find the same conformity to mental symptoms in the condition of the kidneys. But there is a great difficulty of classification of these cases as the emotions are so mixed up in them and we find a patient at different times going through all the phases of the emotions from grave to gay. Dr. Craig has found that generally, excited general paralytics have a low blood pressure, but that in very exalted cases the pressure is high, but he qualifies his remarks about general paralytics because of the small number of cases examined and the unsuitability of most of the cases as they were very advanced. He finds that in the advanced cases the blood pressure is low whatever may have been the previous mental condition. But Dr. Bevan Lewis (1) has long since pointed out that in many cases of general paralysis there is a condition of venous engorgement giving rise to increased vascular tension and a pulse tracing which resembles that of Bright's disease in miniature. Unfortunately he does not give the clinical history of any of the cases, but there is sufficient to show that in some

(1) Journal of Mental Science, April 1881.

cases at least, at one stage there is increased vascular tension, which makes one regret that Dr. Craig was not fortunate enough to get sufficient suitable cases to arrive at definite conclusions. It would then perhaps have been possible to find some classification of general paralytics in which the blood pressure and the kidney change could have been correlated as has been done with mania and melancholia.

The other physical sign to be looked for in granular kidney is hypertrophy of the heart. Here again in the insane there is an anomaly. I have compared the weights of the hearts of all my cases of Mania and Melancholia with the weights given in Dr. Boyd's post-mortem tables, with due consideration of age and sex, and I find that only 4, out of 27 cases of granular kidney in acute mania had hypertrophied hearts, whereas there were 9 hypertrophied hearts out of 21 cases of melancholia with non-granular kidneys. That is to say the percentage of enlarged hearts is greater in the cases where there is no kidney disease.

Although there is such a large percentage of affected kidneys in the insane, yet it is to be noted that the granular change is not nearly so marked

as we find it in cases of chronic Bright's disease.

The kidneys connected with acute mania usually show adhesion of the capsule and marked diminution of the cortex. Cysts are also common. But, cases of very much contracted and small kidneys are rare. The average weight, taking both kidneys together was in males 8½ ounces, and 7½ ounces in females. That is about 2 ounces less than that of normal kidneys. In only 6 cases the combined weight of the two kidneys failed to reach 6 ounces and in 4 of these cases the heart was hypertrophied, and I shall refer to them in discussing the pathology of the subject.

Generally in melancholia the kidneys are normal or they have a full and congested appearance and the capsule is not adherent. The same condition is found in general paralytics. The kidney is rarely normal, but is congested and slightly enlarged. A granular condition is sometimes associated with the congestion and we find the capsule sticky or adherent and the kidney swollen and congested. The average weight in melancholias and general paralytics is in males 11 ounces, and in females 10 ounces, that is, about one ounce more than the normal.

Microscopically, the same differences are appar-

Fig. 1.

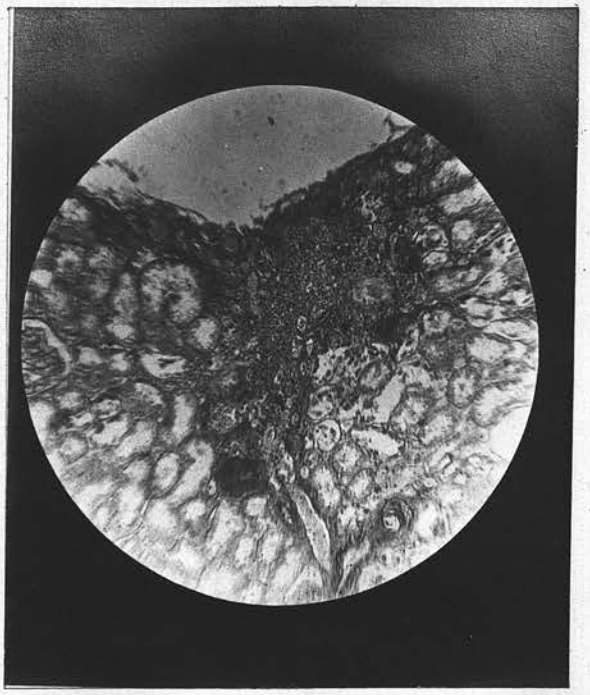


Fig. 2.

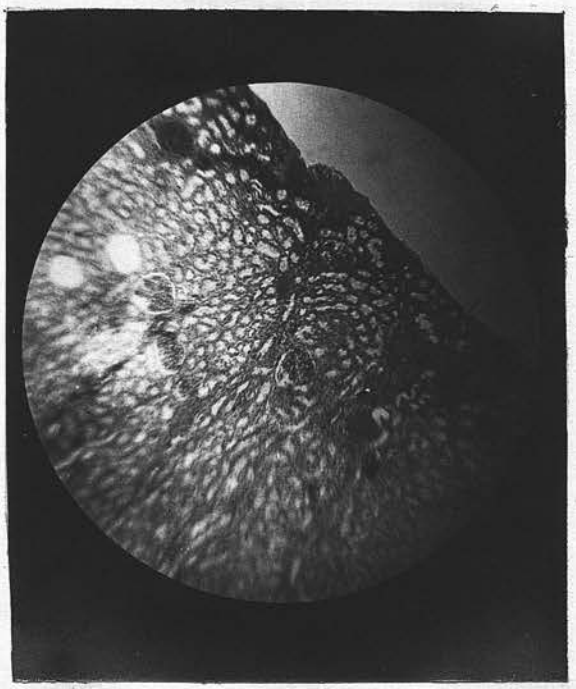
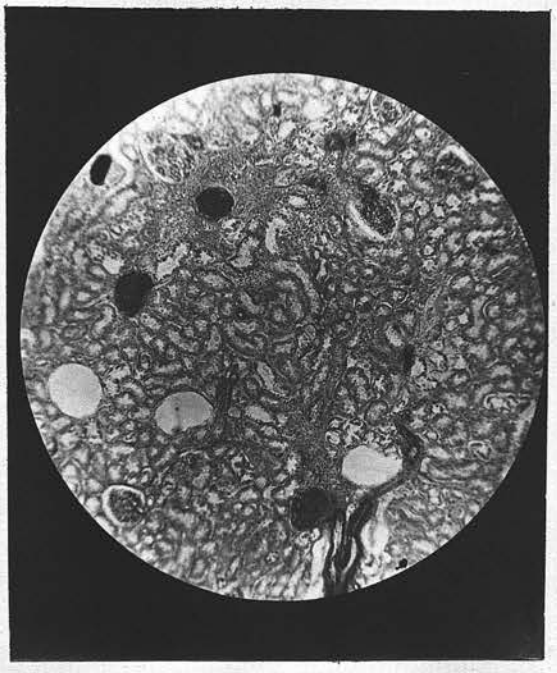


Fig. 3.

Fig. 4.



ent between ordinary chronic Bright's disease kidneys and those in the insane. Fig. 1. shows a wedge of contracted tissue in the cortex, and resembles a case of commencing granular kidney in Bright's disease, but this is the condition of the kidney in a case of mania with subsequent dementia of 14 years duration. Fig. 2 represents an earlier stage, namely in acute mania of just over a year's standing. It is to be noted that the fibrous change occurs in wedges, and that there is plenty of good tissue still available, as may also be seen in another example of early granular change in a recent case of mania, Fig. 3. It is to be noted that the epithelium of the tubules outside the wedge is normal. Fig. 4. is from the same case as Fig. 1. and it is beautifully shown here, how plenty of tubules are left intact and the fibrous change occurs in patches around certain glomeruli which become atrophied and fibrous. The change is evidently intimately connected with the blood vessels. Fig. 5. represents the advancing atrophy of two glomeruli and is from the same case as Fig. 3. The amount of fibrous tissue decreases in proportion to its distance from the glomeruli and the blood vessels, and the epithelium of the tubules on the other hand approaches more nearly the

Fig. 5.

Fig. 6.

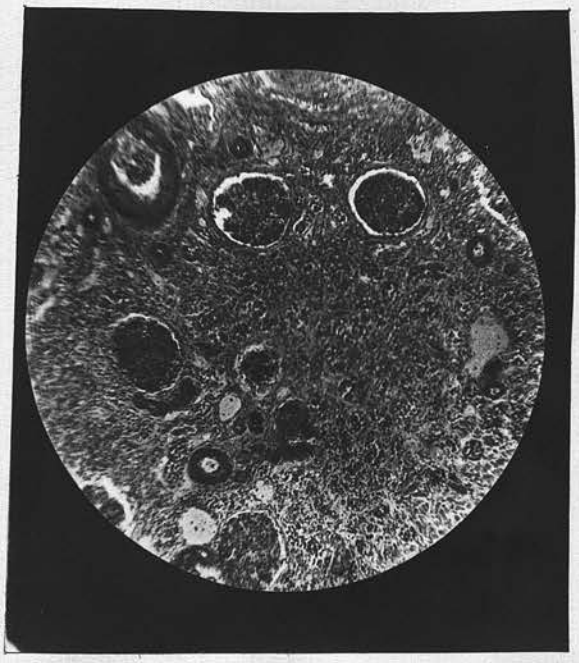


Fig. 7.

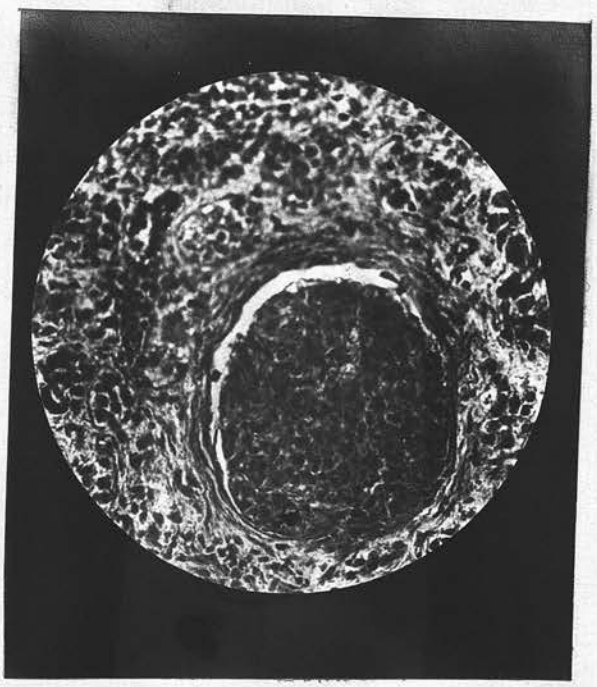


Fig. 8.

normal the further the tubules are from the fibrous thickening.

For comparison, I present Figs. 6 and 7 taken from a case of Bright's disease. Here we see that the tubules are all pressed upon and obliterated and there is marked fibrous tissue increase. These photographs are of the best part of the kidney I could find and are in striking contrast, as regards the amount of available working material shown, to the previous photographs which represent the most affected parts in granular kidneys associated with acute mania.

As I have already mentioned, the kidneys in melancholia and general paralysis are frequently congested, and this appearance is well seen in Figs. 8 and 9. Fig. 8. is from a case of melancholia. The glomerulus is congested, there is no fibrous tissue increase and the epithelium of the tubules is almost normal in appearance. The congestion is also well seen in Fig. 9, from a case of general paralysis. The kidneys were swollen and congested and the capsule sticky and the stripped surface slightly granular. All the capillaries are distended with blood, red corpuscles being seen between the tubules. There is a slight thickening of Bowman's capsule, and the walls of the

Fig. 9.

Fig. 10.

blood vessel entering the glomerulus is thickened. It is interesting to compare this with Fig. 10. from a case of tumour of the kidney causing simple congestion. Here Bowman's capsule is not thickened and the vessel wall is of normal thickness.

These photographs are of typical cases of kidneys in the insane, and I find that in the large majority of cases it is possible to tell what the mental history of a case has been from a microscopic examination of the kidneys. This is specially so in the case of mania and melancholia. But at present, I am unable to differentiate between cases of melancholia and general paralysis.

In discussing the pathology of granular kidney in the insane, we must keep certain facts vividly before us. Whereas in Bright's disease, the granular kidney is accompanied by increased vascular tension, hypertrophied heart and albuminuria, in the insane these sequelae are absent and there are none of the usual clinical signs or symptoms to lead anyone to suspect the presence of disease. This, on first thoughts, seems inexplicable but when we remember the results of Dr. Craig's investigation some light can be thrown on the subject.

When a kidney becomes contracted there is a correspondingly increased resistance to the flow of blood through the renal vessels and as a result of this resistance there is increased blood tension and a resulting hypertrophy of the heart, provided the amount of blood supplied be the same as formerly, and this depends on the tonicity of the coats of the arteries both of the kidney and the general circulation. But we have seen that in cases of acute mania the general pressure is lowered, so that there will be a diminished blood supply to the kidneys which are contracting and so there is not the same resistance as in the kidneys of those who begin to have a contracting kid-

ney and at the same time have a normal blood pressure. Thus the cause, whatever it be, of the low blood pressure in acute mania, acts as a safe-guard to those cases, which develope a contracting kidney, and the heart is spared the additional work, which is thrown upon it in chronic Brights' Disease. The vicious cycle which is set up, in most cases, of the kidneys acting on the heart and the heart reacting on the kidneys, is in this way partly averted and hence the absence of the usual accompaniments of granular kidney. A similar condition of the heart being spared the extra labour is seen, according to (1) Cohnheim, in those cases where amyloid degeneration advances pari passu with chronic nephritis, and where the lowered blood pressure due to the wasting disease counteracts the potential rise due to the nephritis, and thus no hypertrophy of the heart results.

On the other hand, we find that in melancholiacs there is a vastly increased percentage of hypertrophied hearts as compared with that of the insane generally or of the sane. In fact 43% of the cases of melancholia showed marked hypertrophy of the heart. (2) Dr. Beadles also points out this fact, that cases of melancholia are the most liable to cardiac troubles

(1) Cohnheim's "Lectures on General Pathology."
(2) Journal of Mental Science, January 1895.

This is just what one would expect, when we remember the increased blood pressure in melancholia. The heart must increase in size to overcome the increased resistance. The congestion so often seen in the kidneys of melancholiacs is also evidence of this backward pressure, and it is seen also in the kidneys of general paralytics, but here it is frequently associated with some granular change, as has been previously described.

If reference be made to Table VI. it will be seen that the percentage of granular kidney in melancholia is less than half that of cases normal, as regards their mental condition. The question may naturally be asked, "How is this to be accounted for?" If a person be suffering from advancing granular kidney with its concomitant high pressure gets added to this the high pressure of commencing melancholia, the heart has too much work thrown upon it and there is a sudden break down. This may account for these cases of sudden death where there is found at the necropsy a granular kidney which has not been suspected during life owing to its early stage and the want of physical signs. These cases never get time to develope a con-

dition of melancholia sufficient to draw attention to their altered mental condition and so are never admitted into asylums, thus reducing the percentage of melancholiacs in asylums who exhibit granular kidney on the post mortem table, below that of the public at large.

The recurrence of 4 hypertrophied hearts among the cases of mania with excitement is interesting and valuable, as it gives a clue to the time of incidence of the kidney affection, as compared with the duration of the mental disorder. Of these cases only one was over a year in the asylum, and that one only 16 months, but their kidney trouble must have been of longer duration, in fact these were cases of ordinary commencing granular kidney with the usual sequela of enlarged heart setting in, where as in the remainder of the cases of mania there is no hypertrophy of the heart, because the kidney trouble set in subsequent to the mental disorder with its lowering of the blood pressure and thus the hearts in these cases have been spared the increased labour usually associated with cirrhosis of the kidney. This absence of enlarged hearts in cases of granular kidney seems to point to the fact that the kidney trouble is at least not prior

to the incidence of mania. The absence of albumen in the urine of these cases allows us to come still closer to the time of the commencement of the kidney trouble. According to Cohnheim the presence of albumen in the urine is due to an alteration in the constitution of the membranes concerned in the excretion of the urine and this alteration may be caused by a lowering of the blood pressure, as is seen when the renal secretion commences after an attack of cholera, where the urine invariably contains albumen for a time

In the same way we should expect that albumen would appear in the urine in mania, where the blood pressure is lowered, but as I have pointed out, this is not the case. Evidently, there must be something counteracting this falling of the pressure and we find it in the kidney itself. There is the commencing granular change which occludes some of the vessels and so offers a resistance to the blood flow and in this manner a normal pressure is kept up in the kidney and the condition favouring the presence of albumen in the urine is thus averted. Hence we are forced to the conclusion that the kidney change advances pari passu with the mental condition. In fact in a preliminary note to a paper yet unpublished

"On the passage of methylene blue in the kidneys in various forms of psychoses," Pietro Bodoni draws attention to the intimate connection between the mental states and the renal functions. "La funzione renale, piu che allo stato anatomico dei reni, e legata nei pazzi ai disturbi generali che ogni data forma morbosa origina e mantiene; quindi, a seconda di questi disturbi varia la qualita e la quantita de eliminazione di elementi circolanti di rifiuto." (1) Thus we see that there is a most close connection between the kidneys and the mental condition of our patients. I have pointed out in my description of the morbid appearances of the granular kidneys that the fibrous contraction is not nearly so advanced as we see it in some cases of Brights' Disease. There is more than two thirds of the tissue left, so that in my cases it is easily seen why we never get deaths from uraemia. Professor Rose Bradshaw (2) has shown experimentally that kidneys in dogs are able to perform their work even when more than one third of their weight has been excised. I have not examined the blood of patients nor estimated the amount of urea either in the blood or urine, and I hardly think

(1) Rivista di Patologia nervosa e mentale, Oct. 1898.
(2) Lancet March 28th 1898.

that there is sufficient kidney change to give an increase of urea in the blood, but the subject is interesting and one might well repay an examination, if combined with a study of the clinical history of the mental disorder.

Having now established the fact of the frequency of granular kidney in the insane and shown that it is found in those cases where the blood pressure is lowered, the question now presents itself, "Is the alteration of blood pressure the cause of the kidney change?" In my opinion it very probably is. Beneke, as cited by Balfour,(1) holds that the failure of the blood pressure in the aged leads to obsolescence of the capillaries and causes the dry and wrinkled skin, the gray hair and the cessation of the sexual function. In acute mania the blood pressure is lowered and we find a condition of obliteration of the capillaries and small blood vessels of the kidney, a condition which is often found in the kidneys of the aged. In my opinion the granular kidney of the insane is merely a manifestation of the premature senility of these patients which is also shown in their early arrival at a state of dementia and general lowering of the

(1) The Senile Heart.

vital processes. In fact the patients who have suffered from acute mania and are found to have granular kidneys are in the same state as the normal person who has reached the allotted span of human existence.

It is more difficult to carry back the investigation further and to find the cause of the lowered blood pressure. This lies in the domain of the physiological chemist and I feel that some toxin may be found which is the real cause. I have been strengthened in this opinion by reading the statement of Dr. Mott that he has found a toxin in the blood, of general paralytics and that this toxin, Cholin, lowers the blood pressure. It is to be remembered in this connection that Dr. Craig states that the blood pressure of general paralytics in the last stage is markedly lowered.

In all probability such another substance may be found in acute mania, and to this at present unknown substance must be ascribed the cause of the increased frequency of granular kidney in the insane.

Conclusions.

1. That granular kidney is more frequent in the insane than the sane. 2. That the ordinary causes of granular kidney do not affect the insane more than the sane. 3. That in the insane, symptoms of chronic Bright's disease are less frequent than in the sane. The heart is not usually hypertrophied in granular kidney in the insane. 4. That the frequency has a distinct connection with the mental condition of the patient. The condition favouring the occurrence of granular kidney is that of prolonged motor excitement at one period of the illness. 5. That, according to Dr. Craig, a low blood pressure is found in similar cases, whereas in melancholia and delusional insanity the blood pressure is raised. In these latter cases a normal or merely congested condition of the kidneys is found. 6. That, in general paralysis, the kidneys are sometimes granular, sometimes congested, but they probably vary with the condition of the blood pressure, which has, up to the present, not been satisfactorily investigated. 7. That the cause of the lowered blood pressure, or the lowered blood pressure itself, is probably the real cause of the increased frequency of granular kidney in cases of motor excitement.

Pulse Tracings in the Insane.

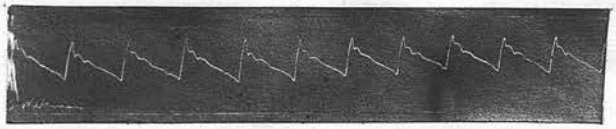
Fig. 1. 

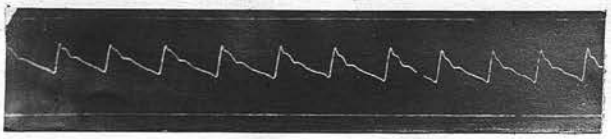
Fig. 2. 

Fig. 3. 

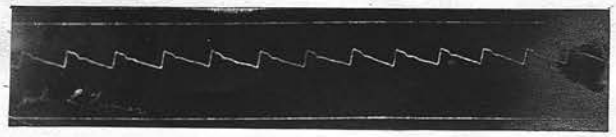
Fig. 4. 

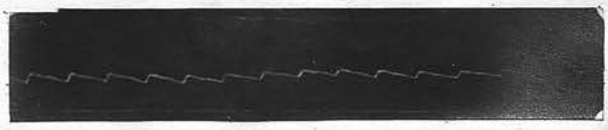
Fig. 5. 

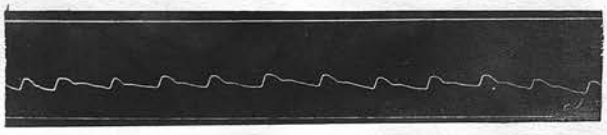
Fig. 6. 

Fig. 7. 

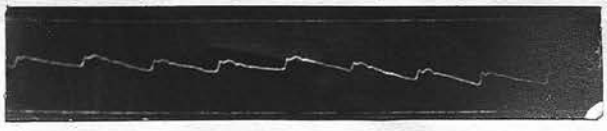
Fig. 8. 

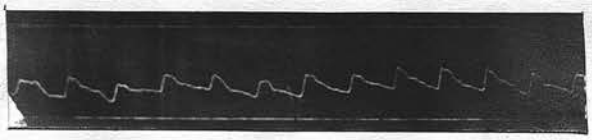
Fig. 9. 

Fig. 10. 

A P P E N D I X.

THE PULSE IN THE INSANE.

The accompanying sphygmographic tracings are a selection from a large number, I have taken and are of types of Insanity corresponding to the classification I have used in discussing the condition of the kidneys. Nos. I. II. & III. are of cases of acute mania with excitement and belong to the type of case, I should expect to find with granular kidney. It is to be noted that they are characteristic tracings of low tension pulses, and correspond to the condition described by Dr. Craig as occurring in this class of insanity.

No. IV. is a tracing in a case of melancholia going into dementia with distinctly suicidal tendencies, and V. is from a case of chronic hallucinatory insanity with most persistent delusions of persecution. They both show a certain amount of high pressure with a weakly acting heart. The up-stroke is short, while the down stroke is lengthened, as if the emptying of the vessel had been prevented by some venous engorgement in front. This condition is more marked in No. VI. where the character of the

tracing is most distinctly one of high tension. It is from a case of acute melancholia with stupor and refusal of food, and corresponds to the type of case described by Dr. Craig as having a high blood pressure. The next tracing No. VII. is of the same case during a slight recovery from his depressed state and shows a pulse of a lower tension. In this type of case I have found the kidneys congested as I have described in a former part of my paper.

It is a long time since Dr. Bevan Lewis drew attention to the condition of the pulse in General Paralytics. He likens the pulse tracing of a class of general paralytics to a miniature tracing of a case of chronic Brights' Disease. There is evidence of high pressure, but the upstroke is short, and he ascribes the condition to a failing heart and venous engorgement in front. Tracings VIII. & IX. represent this condition. This is the usual type of pulse tracing in general paralytics, but in some very exalted and excited cases, I have seen a low blood pressure, and No. X. is a tracing of a pulse of one of the most excited general paralytics, I have ever met. He is a most powerful man still, and has been in a state of exaltation for the past 4 years. The high

upstroke is to be noted, indicating a powerfully acting heart, which is an exception in general paralysis. Dr. Bevan Lewis' explanation of the pulse tracings as seen in VIII. & IX. is probably the true one, as in this type of case I have found congestion of the kidneys. (Vide P. 34 Fig. 9) I am able to leave out the word type and talk of a definite case in tracing No. IX. as within the past few days, this general paralytic has died and his kidneys as I expected were markedly congested, resembling those described in a previous part of my paper.

Note.

Since the above was typewritten, the patient from whom tracings Vl and Vll were taken has died. As I mentioned he was a case of melancholia, with a high tension pulse, that is, a case where, as I have shown, one does not expect granular kidneys in the insane. The case has turned out according to my expectations, as the kidneys were slightly congested and the capsule stuffed most readily, in fact, the kidneys were similar to the usual condition I have found in other melancholics, and bears out my contention that even with a high tension pulse, granular kidney is not to be expected in the insane.

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